

BLOKHIN, A.S.; ~~BOBODZYUK~~, G.G.; LESHCHINSKIY, A.A.; OKSMAN, A.K.;
KOSMINSKIY, O.F.; MANUSHKIN, A.Ye.; MILEVSKIY, Yu.S.;
DRIATSKIY, N.M.; VASIL'YEV, V.V.; L'VOVICH, A.A.;
ORLEYEVSKIY, M.S.; MOROZ, I.A.; OKSIAN, A.K.; KNEL', G.S.;
SOROKIN, M.F.; BUTLITSKIY, I.M.; VASIL'YEV, L.N.[deceased];
GINTS, Yu.R.; VASIL'YEV, G.K.; LUGOVSKOY, N.Ye.; KIRILLOV,
Ye.V.; STRUYKINA, N.S.; LEVINOV, K.G.; BLOKHIN, A.S., otv.
red.; GURIN, A.V., red.; SLUTSKIN, A.A., tekhn. red.

[K-1920-frequency telephone system] Sistema vysokochastotnogo
telefonirovaniia K-1920; informatsionnyi sbornik. [By] A.S. Blokhin
i dr. Moskva, Sviaz'izdat, 1962. 319 p. (MIRA 16:4)
(Telephone)

BORODZULYA, G.F.

Automatic turret head for program-controlled lathes.
Mashinostroitel' no.9:19 S '64. (MIRA 17:10)

Borog, M. A.

Mittel'shtedt, A. A., Bauman, L. K., and Borog, M. A. "Changes in carbon-dioxide and nitrogen exchange in wartime brain traumas", In the collection: Nevrologiya voyen. vremeni, Vol. I, Moscow, 1949, p. 105-14

SO: U-411, 17 July 1953, (Letopis 'Zhurnal 'nykh Statey, No. 20, 1949)

BOROGI, Gyorgy

Data on the origin of certain waves in ballistocardiogram. Magy.
belorv. arch. 11 no.2-3:49-52 Apr-June 58.

1. Budapesti Varosi Tanacs Kozponti Szivbeteggondozo Intezete kozle-
menye (Igazgato foorvos: Dr. Plenczner Sandor)

(BALLISTOCARDIOGRAPHY

pathol. origin of various waves in ballistocardiogram (Hun))

L 06347-67 EWT (m) GD

ACC NR: AT6032306

SOURCE CODE: UR/0000/66/000/000/0059/0068

AUTHOR: Borog, V. V.; Kirillov-Ugryumov, V. G.; Petrukhin, A. A.; Rozental', I. L.; Shestakov, V. V.

ORG: none

TITLE: Ionization calorimeter for the investigation of high energy cosmic muons at large zenith angles 55
12+1
19

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Fizika elementarnykh chastits (Physics of elementary particles). Moscow, Atomizdat, 1966, 59-68

TOPIC TAGS: muon, calorimeter, bremsstrahlung, cosmic ray measurement, angular distribution, ionization chamber, waveguide

ABSTRACT: A study of high energy muons, using the horizontal flux zenith angles $\geq 60^\circ$ of cosmic rays at sea level was made and an ionization calorimeter developed for this purpose is described. Such a study is feasible because the horizontal flux at large zenith angles θ consist almost exclusively of muons and the intensity of muons for energies $>10^{11}$ ev increases with θ . The apparatus uses muon flux to study high energy muon interactions with matter and measures the characteristics of the horizontal muon flux to determine the angular and energy distributions. The ionization calorimeter enables one to study both of these areas by observing the showers produced by the muons due primarily to bremsstrahlung and nuclear interactions. It detects muons

Card 1/2

L 06347-67

ACC NR: AT6032306

in the energy interval $2 \cdot 10^{11} - 5 \cdot 10^{12}$ ev for $60^\circ \leq \theta \leq 90^\circ$. The instrument consists of 150 ionization chambers arranged in six rows, forming a coordinate set for determining the angle made of a shower. A layer of iron 9 cm thick is placed between each row with a total weight >40 tons. Each chamber is made from a section of waveguide 110×54 mm and 3 m long with an electrode 3 mm in diameter at +1200 volts, filled with argon at a pressure of 5 atm. A block diagram of the major component is shown. The pulse from each chamber is amplified and then stored on capacitors in the memory section which is successively probed by a mechanical commutator. The commutator signal is photographed using an H-700 loop oscilloscope. The event selection and switching of the detector take place in the control block. The registration block records the data and a timing relay fixes the detection time of a given event. Orig. art. has: 2 formulas, 7 figures.

SUB CODE: 20/

SUBM DATE: 25Feb66/

ORIG REF: 003/

OTH REF: 008

Card 2/2 MLE

ACC NR: AF7007079

SOURCE CODE: UR/0048/66/030/010/1666/1668

AUTHOR: Borog, V. V.; Kirillov-Ugryumov, V. G.; Petrukhin, A. A.; Shestakov, V. V.

ORG: none

TITLE: Non-electromagnetic interactions of superhigh-energy muons [Paper presented at the All-Union Conference on Cosmic Radiation Physics, Moscow, 15-20 Nov 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 10, 1966, 1666-1668

TOPIC TAGS: muon, cosmic radiation

SUB CODE: 20

ABSTRACT: The non-electromagnetic interactions of superhigh-energy muons ($E \gtrsim 10^{11}$ ev) were recorded at an installation for the study of cascade showers produced by cosmic radiation muons impinging at large zenith angles (cf. Borog et al, Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 30, 10, 1669, 1966). The only known process which could give rise to the non-electromagnetic cascade showers recorded was that of nuclear interaction of muons. A comparison of the spectra of nuclear and electromagnetic showers made it possible to evaluate the cross-section $\sigma_{\gamma N}$ of the photonuclear process at $E \gtrsim 10$ ev. By using the relation derived by P. & D. Kessler (Compt. Rend. 244, 1896, 1957), which applies to any transmitted energies, it was established that

$$\sigma_{\gamma N} = 0.15 \begin{matrix} +0.20 \\ -0.10 \end{matrix} \cdot 10^{-28} \text{ cm}^2 \text{ per nucleon.}$$

Card 1/1 Orig. art. has: 3 figures and 2 formulas

ACC NR: AP7007080

SOURCE CODE: UR/0048/66/030/010/1669/1673

AUTHOR: Borog, V. V.; Kirillov-Ugryumov, V. G.; Petrukhin, A. A.;
Rozental', I. L.; Shestakov, V. V.

ORG: none

TITLE: Study of the energy spectrum of cosmic-ray muons on the basis of
electron-photon showers [Paper presented at the All-Union Conference on Cosmic
Radiation Physics, Moscow, 15-20 Nov 1965]

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 10, 1966,
1669-1673

TOPIC TAGS: calorimeter, cosmic ray, muon

SUB CODE: 20

ABSTRACT: At present, outer space is the only accelerator of particles with
superhigh energies. The energy spectrum of electromagnetic cascades produced by
superhigh-energy muons ($E_{\mu} \gg 10^{11}$ ev) impinging at angles $\geq 55^\circ$ was studied
at sea level on an ionization calorimeter consisting of six rows of Ar-filled
ionization chambers, 25 in each row, with an iron interlayer between the cham-
bers acting as an absorber. The majority of the cascades recorded were due to
the interaction of muons with the absorber. A small number of showers ($< 1\%$)
was produced by nucleus-reactive particles. The energy spectrum of the muons
was determined on the basis of the recorded showers due to high-energy photons
and electrons formed by interaction of the muons with atoms of the absorber.
Mathematical equations expressing the experimentally determined energy spectrum

The authors thank G. G. Bunatyan for help in carrying out the numerical compu-
tations on the BESM. Orig. art. has: 4 figures and 6 formulas. [JPRS: 39,658]

Card 1/1

6664-65 EWO(j)/EWT(m)/EPP(c)/EPR/EWP(q)/EWP(h) Pr-4/PS-4 JD

ACCESSION NR: AP4042601

6/0076/64/038/007/1849/1851

AUTHOR: Borogolskiy, M. M.; Yaremin, Ye. N.

TITLE: Formation of nitric oxide in a pulse discharge

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 7, 1964, 1849-1851

TOPIC TAGS: nitric oxide, pulse discharge, arc discharge, glowing discharge, emission spectroscopy

ABSTRACT: This work is an attempt to carry out a reaction for the production of nitric oxide from air at maximum obtainable currents under laboratory conditions in a pulse discharge. In this work a circulation set-up was used for production of oxides of nitrogen, described by F. Haber, A. Koenig and E. Platon (Z. Electrochem., 13, 725, 1907; 14, 689, 1908). It is concluded that in a pulse discharge the yield of nitric oxide is low because of the complete decomposition of molecules into atoms. It was also found that formation of nitric oxide in a glowing discharge or a glowing arc proceeds primarily via the excited state of nitrogen molecules. Orig. art. has: 2 figures.

Card 1/2

I. 6664-65

ACCESSION NR: JP4042601

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 20JUN63

DATE ACQ: 1963

ENCL: 00

SUB CODE: GC

NO REF SOV: 002

OTHER: 002

Card 2/2

BOROJEVIC, Dragan, dipl. inž. Zagreb)

Development of the electric network of the city of Virovitica.
Energija Hrv 13 no.7/8:226-233 '64.

1. Institute of Electric Industries, Zagreb, Proleterskih
brigada 37.

COUNTRY : Yugoslavia
CATEGORY : Cultivated Plants. Grains. Leguminous Grains. ^M
Tropical Cereals.
ANAL. JOUR. : Ref Zhur-Biologiya, No.4, 1959. No.15593
AUTHOR : Borojevic, Slavko
EDITOR : --

TITLE : Trends in Wheat Selection in Yugoslavia
ORIG. PUB. : Poljopr. Vojvod., 1958, 6, No.3, 187-191

ABSTRACT : No abstract

CARD:

: 1/1

BOROK, A.

Urgent problems. Mik.-elev. prom. 25 no.10:31 0 '59 (MIRA 13:3)

1. Kuybyshevskaya mel'nitsa No.2.
(Grain--Storage)

BOROK, A. M.

USSR/Engineering - Machine Tools

Card 1/1

Author : Borok, A. M.

Title : Technological modernization of a horizontal milling machine

Periodical : Stan. i instr. 24/4, 33, April 1953

Abstract : The author recommends the use of a six-spindle drilling and milling unit on the bed of a horizontal milling machine in connection with a four-position device for holding the part to be machined. He illustrates his explanations with drawings and claims that the method increases production and frees the boring machine for other work.

Institution :

Submitted :

8(4), 9(0)

SOV/112-59-2-3698

Translation from: Referativnyy zhurnal. Elektrotehnika, 1959, Nr 2,
pp 209-210 (USSR)

AUTHOR: Donskoy, A. V. , Borok, A. M. , and Ivenskiy, G. V.

TITLE: Ionic Frequency Converters for Electrothermal Installations
(Ionnyye preobrazovateli chastoty dlya elektrotermicheskikh ustanovok)

PERIODICAL: V sb.: Prom. primeneniye tokov vysokoy chastoty. Riga, 1957,
pp 273-286

ABSTRACT: A 60-kw ionic frequency converter for electrothermal installations developed by LII imeni M. I. Kalinin is described. Its output frequency is 2,500-2,800 cps. Its scheme has an implicit DC circuit. Six TR1-15/15 thyratrons are connected on their cathode side in three groups of two and connected to the three-phase rectifying transformer; on their anode side, they are arranged in two groups of three each and connected to the terminals of a single-phase inverter transformer. A smoothing choke coil is connected

Card 1/3

SOV/112-59-2-3698

Ionic Frequency Converters for Electrothermal Installations

between the neutrals of both transformers. An oscillatory circuit formed by the furnace inductor and the phase-control capacitor serves as a load for the converter. The grid-control circuit of the inverter is fed from the converter output via an RC phase shifter. The self-control feature secures the following: (1) an automatic frequency control as the circuit parameters change in the course of metal heating; and (2) short-circuit protection upon collapse of inverter oscillations. However, an additional special device to open the valves for starting is required. When the power is adjusted by the phase shifter, the inverter-transformer ratio is changed and the firing-point-controlling capacitors are switched simultaneously. In the schemes with an explicit DC circuit, the rectifier grid control can be used advantageously. Experimental regulating and load characteristics of the converter are presented. It is pointed out that in schemes with higher frequencies, it is expedient to prolong the recovery time for the valves. Another solution is to use a converter with a

Card 2/3

SOV/112-59-2-3698

Ionic Frequency Converters for Electrothermal Installations

triple output frequency; its briefly presented scheme is a combination of three single-phase inverters whose inverter-transformer secondaries are connected in open delta. Bibliography: 10 items.

V.A.L.

Card 3/3

Borok, A.M.

110-4-14/25

AUTHORS: Donskoy, A.V., Doctor of Technical Sciences, Professor,
Borok, A.M., Ivenskiy, G.V., and Khansuvarov, A.A., Engineers.

TITLE: A High-frequency Electro-thermal Installation of a New
Series (Vysokochastotnaya elektrotermicheskaya ustanovka
novoy serii)

PERIODICAL: Vestnik Elektropromyshlennosti, 1958, No. 4,
pp. 42 - 47 (USSR).

ABSTRACT: High-frequency electro-thermal installations with valve
generators for induction-heating are widely used. A mass-
produced equipment has lacked anode voltage stabilisation and
needs careful screening to reduce radio interference. A new
series of equipment has been developed that operates at a
frequency of 70 kc/s, so that both the fundamental and the
second harmonic are outside the standard frequency range for
radio interference. This new equipment, type ЭТНЗ-67 , employs
a stabilised anode-controller rectifier. The main technical
data are given with a full-circuit diagram in Fig.1 and the
main components of the circuit are described: the rated output
is 60 kW. The principles of the grid control system are des-
cribed. A change of the grid voltage varies the firing angle of
the valve. The main advantage of the circuit is its simplicity
and although the accuracy of stabilisation is less than that
Card1/2 of existing circuits, it is nevertheless adequate. The equipment

110-4-14/25

A High-frequency Electro-thermal Installation of a New Series

includes protection against short-circuit, overload and under-voltage. A general view of the equipment is given in Fig.2. It is housed in a number of separate cubicles, whose contents are described.

A wide range of tests was made on the equipment; its characteristics are given in Fig.3. These curves show that the generator can easily be adjusted to give the best operating conditions on the most varied loads. The oscillatory power ranges from 40 - 60 kW and the efficiency of the generator valve is 72 - 78%. The power-factor depends on the ignition angles of the thyatron and ranges from 0.72 - 0.93. During the tests careful measurements were made of radio-interference with the results plotted in Fig.4, which shows that interference is worst at light-loads but is still within the specified limits even when the cubicle doors are open.

There are 4 figures, and 3 Russian references.

ASSOCIATION: The Leningrad Works for High-frequency Installations
(Leningradskiy zavod vysokochastotnykh ustanovok)

SUBMITTED: October 18, 1957

AVAILABLE: Library of Congress

Card 2/2

8(3)

AUTHORS:

Donskoy, A. V., Doctor of Technical Sciences, SOV/105-59-7-10/30
Ivenskiy, G. V., Candidate of Technical Sciences, Borok, A. M.,
Engineer

TITLE:

Ion Frequency Converters for Induction Heating Installations
(Ionnyye preobrazovateli chastoty dlya ustanovok induktsionnogo
nagreva)

PERIODICAL:

Elektrichestvo, 1959, Nr 7, pp 41 - 45 (USSR)

ABSTRACT:

The USSR industry at present produces large thyratrons of the TR-15/15-type within a sufficiently short time for the re-establishment of the controllability of the grid. Investigations show that they operate with sufficient reliability in frequency converters of 50/2500 cycles. The wiring diagrams of these converters are given. As the basic wiring diagrams of similar converters have already been dealt with by the papers of references 1 and 2, the auxiliary circuits are in this case mainly investigated. Figure 1 shows the wiring of an ion frequency converter of 50/2500 cycles and 60-80 kw with a direct current term, which is described. It has been used for the melting of metal since July 1957 at the Laboratoriya elektrotermicheskikh ustanovok LRI im. Kalinina (Laboratory for Electrothermal Installations at the

Card 1/3

Ion Frequency Converters for Induction Heating Installations SOV/105-59-7-10/30

LPI im. Kalinina (Leningrad Polytechnic Institute imeni Kalinin). The rectifier of this converter is a three-phase single-cycle rectifier with 3 valves and one converter. The inverter is constructed as a single-phase single-cycle inverter with 2 valves and 1 converter. It is shown that an inverter for 2500 cycles embodied within the thyatron mentioned must necessarily be a single-cycle inverter. Regulation of the initial output P_k is brought about by variation 1) of the capacity of the capacitor C_k , 2) of the phase shift angle φ between the grid- and anode voltages of the thyratrons of the inverter group, and 3) of the economy transformer coupling of the load circuit $L_k C_k$ with the inverter-transformer.

The experimentally obtained characteristics of the converter corresponding to these three kinds of regulation are shown by figure 2. The disadvantage of the 1. and 2. method is the stepped regulation. Apart from the circuit shown by figure 1, where one valve group is used only for rectification and the other only for inverting the current, also ionic converters with a direct current element (Refs 1, 2) may be used in electrothermal installations. In this case the same valves are used for rectification and inversion. Such a converter, consisting of a three-phase one-cycle rectifier

Card 2/3

Ion Frequency Converters for Induction Heating Installations SOV/105-59-7-10/30

and a single-phase one-cycle inverter with 60-80 kw is shown by figure 4. This inverter was investigated in the above laboratory, where it was used for a long period. The life of the thyratrons TRI-15/15 of the converter group is, as shown by experience, about 800 - 900 hours. There are 5 figures and 5 Soviet references.

ASSOCIATION: Leningradskiy politekhnicheskij institut im. Kalinina (Leningrad Polytechnic Institute imeni Kalinin)

SUBMITTED: May 16, 1958

Card 3/3

		LIB AND IND ORDER		PROCESSES AND PROPERTIES INDEX		IMP AND ATP (POINTS)	
M		Borok B.H.				21	
<p>Copper Powder for Electro-Chemical Applications. R. A. Borok, M. I. Babshin, and N. A. Gavrilov (<i>Niimash (Bull. Sci. Res. Ind. Machinebuilding and Metal Treatment), 1955, (3), 27-33.</i>)—[In Russian.] The production of copper powder by electrolysis and its properties are described.—N. A.</p>							
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13

On the Problem of Hot-Pressing Hard Alloys with a Tungsten Carbide Bases by the Method of Hot-Pressing. B. A. Ropyk and N. M. Zarubin (Nimash (Hull. Sci. Res. Ind. Machine-Building and Metal Treatment), 1966, (4), 28-35).—[In Russian.] Hot-pressing is technically and economically unprofitable for hard alloys with a relatively low melting bond, but it can be rationally applied for the production of hard alloys of the cast type. The hardness and tenacity of hot-pressed alloys are higher than those of cast alloys. N. A.

BUKOK, B. A.; KUZNETSOV, V. I.; GOFNER, A. N.; KUNIS, M. I.; PRYANISHNIKOV, S. S.

"The highly effective electrodes for arc electric welding," Industrial Energetics, 1951.

AUTHORS: Borok, B.A., Gavrilin, V.I., SOV/32-24-9-45/53
 Lobashev, B .P., L'vovskaya, V.P.

TITLE: Perfection of the Furnace TTV-2 for Use in Vacuum and Controllable Atmospheres (Usovershenstvovaniye pechi TTV-2 dlya raboty v va-kuume i kontroliruyemykh atmosferakh)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol 24, Nr 9, pp 1158-1159 (USSR)

ABSTRACT: The furnace mentioned in the title, which is built at the "Platino-pribor" factory, was rebuilt for experiments in a controllable atmosphere and with a greater capacity. B.V. Fedin and B.P. Lobashev, as well as A.F. Androsov and Ya.I. Pikalov took part in the reconstruction. The temperature control was changed from a step-like to a continuous one. As hitherto the furnace has been operating only in vacuum no special fixing of the upper part of the furnace to the furnace body has been provided. This had to be changed as in the present case the pressure within the furnace is equal to atmospheric pressure. The increase in dimensions of the furnace was carried out in two variables. First, an increase of the radius of the tungsten heater (to 90 mm), which secured a temperature of 2300°. In the other case a temperature of 1400° could be obtained by using a heater of molybdenum sheet with a diameter of 130 mm.

Card 1/2

Perfection of the Furnace TVV-2 for Use in Vacuum
and Controllable Atmospheres

SOV/32-24-9-45/53

The temperature control by the transformer OSU40/0,5 as practised up to now was changed by L.N. Petrov by introducing the transformer ST-34 (or ST-24) and the autotransformer TNN-40. The life of the two heaters is given with 1,5 months. A diagram of the changed furnace TVV-2 is given, and it is mentioned that the furnace has been successfully used for 5 years. There is 1 figure.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (Central Scientific Research Institute of Ferrous Metallurgy)

Card 2/2

SOV/136-59-6-10/24

AUTHORS: Suchkov, A.B., Borok, B.A., Yermakova, T.N.,
Rodnyy, M.I. and Boldina, L.D.

TITLE: On the Production of Titanium by Electrolysis of Molten
Salts, Using Soluble Anodes (Nekotoryye voprosy
polucheniya titana elektrolizom rasplavlennykh
sred s ispol'zovaniyem rastvorimyykh anodov)

PERIODICAL: Tsvetnyye metally, 1959, Nr 6, pp 57-62 (USSR)

ABSTRACT: Any titanium compound possessing electronic
conductivity can be used as soluble anode. The
authors used titanium nitrides and carbides and
hydrogen-containing, oxygenous and inter-metallic
compounds of titanium, as well as titanium-base alloys
for their experiments. These were carried out in a large
laboratory plant with a maximum current supply of 1000 A.
The electrolysis cell is shown diagrammatically in the
figure, p 57 (1 - bath; 2 - lid; 3 - cell; 4 - anode lead;
5 - cathode lead; 6 - syphon). The entire apparatus was
made of stainless steel. Compact anodes, made by
powder metallurgical methods were used. These were
fixed into position and connected up and a mixture of
dry NaCl and KCl (1:1) was charged into the bath.

Card 1/4

SOV/136-59-6-10/24

On the Production of Titanium by Electrolysis of Molten Salts
By Using Soluble Anodes

Any residual moisture and occluded gases were removed by melting. A second (electrolytic) purification was carried out, in the course of which the electrolyte was saturated with titanium by means of an auxiliary cathode, and then electrolysis with a working cathode was carried out. All operations were carried out in a stream of dry, purified argon. All the experiments were performed at a temperature of 760°C and in each case the quantity of electricity was the same (1500 A hours). The following were analyzed: the cathode powder obtained on working with the auxiliary cathode; three layers of the cathode deposit (internal, middle and outer); three layers of anode slime; the electrolyte and the removed products. The results of experiments with Ti-Fe, Ti-Al, Ti-Si and Ti-Nb alloys are shown in Table 1. At present the authors are engaged on the study of binary alloys of Ti and Ni, Ca and similar metals, and Mn. Preliminary experiments have shown that the behaviour of Ni is

Card 2/4

SOV/136-59-6-10/24

On the Production of Titanium by Electrolysis of Molten Salts
by Using Soluble Anodes

analogous to that of Fe; Ca and like metals dissolve off the anode preferentially to titanium but are not deposited at the cathode. If Mn is present in the anode, the latter is soluble only if its oxygen content is extremely small. Dean's findings regarding the sharp drop in the solubility of titanium in the presence of oxygen have been confirmed. The results obtained for anode material containing 0.3% O₂ are shown in Table 2. Preliminary experiments with multi-constituent alloys have led to the conclusion that most metals change the anodic solution process of titanium, as known for binary alloys, very little. This should enable electrolytic refining of preliminarily reduced titanium raw materials (slag and concentrates) to be used as a general method for producing titanium. In order to verify this assumption, the authors carried out a series of experiments using calcium hydride as reducing agent. The experiments were carried out in an apparatus consisting of a cylinder containing argon, and a container and lid made from stainless steel. The sinter

Card 3/4

SOV/136-59-6-10/24

On the Production of Titanium by Electrolysis of Molten Salts
by Using Soluble Anodes

obtained as the result of reduction was rapidly broken up and treated in a mixer, first with water, then with 1% HCl solution until the CaO had fully dissolved. The pulp was filtered off and the powder washed with water and alcohol, and after drying was studied chemically and metallographically. In the experiments the basic following parameters were varied: temperature, proportion of reagents, duration and fineness of mixture. It was found that reduction proceeds satisfactorily when the mixture is ground to a fineness of 0.147 mm or less. The optimum processing conditions are (a) for slag - 1100°C, 2 hours, 1.8 - 2.0 kg CaH₂/kg Ti; (b) for concentrates - 1200°C, 2 hours, 2.2 - 2.4 kg CaH₂/kg Ti. Thereby, 85 to 95% Ti contained in the original materials is extracted as a solid solution (see Table 4). The material thus obtained was compacted into anodes and electrolytically refined. The results of such refining of slag and concentrates are identical and are shown in Table 5. There are 5 tables and 1 figure.

Card 4/4

BERK, B.A.

PHASE I BOOK EXPLOITATION

SOV/4508

Akademiya nauk SSSR. Institut metallurgii

Titan i yego splavy, vyp. 3: Metallovedeniye titana (Titanium and Its Alloys, No. 3: Metal Science of Titanium) Moscow, Izd-vo AN SSSR, 1960, 161 p. Errata slip inserted. 2,700 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A.A. Baykova.

Resp. Ed.: N.V. Ageyev, Corresponding Member, Academy of Sciences USSR; Ed. of Publishing House: M.L. Podgoyetskiy; Tech. Ed.: Ye. V. Makuni.

PURPOSE: This collection of articles is intended for scientific research workers and metallurgical engineers.

COVERAGE: The articles summarize results of experimental studies of titanium-base alloys. The microstructure and mechanical properties of titanium-base alloys containing aluminum, chromium or other metals are analyzed along with the effect of oxygen, hydrogen and heat treatment on alloy structure and properties. The tendency of titanium alloys to embrittlement as a result of strain

Card 1/6

Titanium and Its Alloys (Cont.)

SOV/4508

aging is emphasized, and the nitriding of titanium, carried out to increase the surface strength and wear resistance of titanium alloys, is described. Transformations occurring in commercial titanium under conditions of electric heating are examined. Attempts to develop titanium-base alloys capable of withstanding temperatures over 400°C are discussed as are problems of titanium-powder metallurgy and weldability of certain titanium-base alloys. No personalities are mentioned. Most of the articles have bibliographic references, the majority of which are Soviet.

TABLE OF CONTENTS:

Timoshenko, N.N. and Ye. V. Petunin. Investigation of the Microstructure and Mechanical Properties of Titanium Alloys With Aluminum	3
<u>Borck, B.A., L.S. Golubeva, and R.P. Shchegoleva. Effect of Heat Treatment on the Structure and Properties of Titanium Alloys</u>	10
Moiseyev, V.N. Diffusion of Gases Into Titanium Heated in the Open Air and the Effect of Diffused Gases on Mechanical and Processing Properties of Titanium Sheets	17
Borisova, Ye.A. Effect of Oxygen and Hydrogen on Mechanical Properties of Al Alloys	23
Card 2/6	

Titanium and Its Alloys (Cont.)

SOV/4508

Yakimova, A.M. Effect of Hydrogen on Mechanical Properties of Alloys With The $\alpha + \beta$ Structure	29
Novikova, Ye. N. Nitriding of Titanium Alloys in Pure Nitrogen	35
Nikitenko, R.N. Distinctive Features of the Plasticity and Aging of the Ti - Al Binary Alloys	41
Danilova, G.P., I.P. Druzhinina, and M.V. Mal'tseva. Investigation of the Heat-Treatment Effect on Mechanical Properties of Titanium Alloys	52
Gridnev, V.N., and V.I. Trefilov. Microstructure of Martensite in Titanium-Chromium Alloys	58
Gridnev, V.N., V.I. Trefilov, and N.F. Chernenko. Transformations Occuring in Commercial Titanium and in Titanium-Iron Alloys Under Electric Heating	61
Luzhnikov, L.P., and V.M. Novikova. Regularity Patterns in the Changes of Mechanical and Processing Properties of Ternary Titanium-Base Alloys (With Aluminum, Chromium, Manganese, Molybdenum, and Iron)	66

Card 3/6

Titanium and Its Alloys (Cont.)

SOV/4508

Neugodova, V.N. Search for Titanium-Base Alloys to be Used at Temperatures Above 400°C	74
Solonina, O.P., and G.M. Kokhova. The VTZ and VTZ-1 Heat-Resistant Titanium Alloys	79
Shchegoleva, R.P., and L.S. Golubeva. Powder Metal Alloys of High Yield-Strength Per Unit Weight	84
Glazunov, S.G., and Ye. A. Borisova. Titanium-Base Alloys Used for Making Sheets	90
Borisova, Ye.A., S.G. Glazunov, and G.N. Tarasenko. High-Strength Titanium Alloys Used for Making Sheets	94
Timoshenko, N.N., and Ye.V. Petunina. Development and Investigation of Titanium-Base Powder Metal Alloys	99
Blok, N.I., A.I. Glazova, and N.F. Lashko. Phase Analysis of Complex Titanium Alloys	107

Card 4/6

Titanium and Its Alloys (Cont.)	SOV/4508	
El'yasheva, M.A. Cyclic Endurance of Titanium and Its Welded Joints		113
Gurevich, S.M. Metallurgical Problems in Titanium Welding		124
Shorshorov, M.Kh., and G.V. Nazarov. Weldability of the VT1 Titanium and of the VT5 Alloy		135
Poplavko, M.V., N.N. Manuylov, and L.A. Gruzdeva. Welding Titanium-Base Alloys		141
Polyakov, D.A. Argon-Arc Welding of Titanium Products		147
Aksenov, G.I., V.G. Khromov, A.N. Nikolayev, and Yu.N. Semenov. Roll-Pressing Titanium Powder Into a Thin Band by Using the Method of the Gor'kiy Polytechnical Institute		152
Kanyshkov, A.S. Result of Using Titanium in a Plant		159

Card ~~5~~/6

68241

S/136/60/000/03/013/020
E071/E435

18.6100
AUTHORS: Timoshenko, N.N., Borok, B.A., Patunina, Ye.V.,
Shchegoleva, R.P. and Golubeva, L.S.

TITLE: Titanium Based Metalloceramic Alloys

PERIODICAL: Tsvetnyye metally, 1960, Nr 3, pp 68-74 (USSR)

ABSTRACT: The branch of Powdered Metallurgy of the Central Iron and Steel Scientific Research Institute produces titanium based alloys in the form of sintered semis up to 80 kg which are worked into rods, sheets, strip, plates and wire. At present, equipment is being introduced for pressing semis up to 250 kg in weight. The experimental material on the influence of various alloying elements on titanium (IMP-1A) accumulated in the Institute is briefly described. The influence of aluminium, vanadium, iron, manganese, tin and niobium on the mechanical properties of IMP-1A alloy (strength at +20 and +400°C; reduction in arc (neck) at +20 and -60°C) is shown in the plot, Fig 1. Of the titanium alloys for the production of sheets the most systematic investigation was carried out for the ternary system Ti-Al-V. The alloy IMP-7 (Ti + 3% Al + 2% V) is

Card 1/3

68241

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E071/E435

Titanium Based Metalloceramic Alloys

being produced; the properties of this alloy are given in Table 1. The manufacture of an alloy of Ti + 4% Al + 2% V (IMP-9) is proposed for the production of sheets for operating at elevated temperatures (400 to 500°C; properties given in Table 2). Alloys for the production of hot rolled tubes, forging and stamping (IMP-6/1 and IMP-6/2) composition as given Table 4), after hot working by pressure, possess the structure of metastable β phase with a small amount of α phase. This makes it possible to limit thermal treatment only to annealing of forged and hot rolled metal. The dependence of hardness of the above alloys on annealing temperature (200 to 600°C) is shown in Fig 3. The heat resistant alloy T.4 is a six component metalloceramic alloy (composition not given) and was developed for forging and stamping. The dependence of its mechanical properties on temperature is plotted in Fig 4. Titanium alloys possessing the best strength and plasticity for the production of parts by sintering (with minimum subsequent machining) were ✓

Card 2/3

68241

S/136/60/000/03/013/020
E071/E435

Titanium Based Metallo-ceramic Alloys

found to belong to binary systems of Ti-V and Ti-Mo and ternary alloys of the above systems with aluminium. Their compositions and mechanical properties are given in Table 5. Properties of γ phase of heat resistant alloys of the Ti-Al system are briefly discussed. Data on the hardness of this type of alloy and its susceptibility to oxidation are given in Table 6, and Fig 5 respectively. Alloying of the alloy Ti + 33% Al with 2% nickel improves its working properties. A high resistance of this type of alloy to oxidation, a low decrease in strength with increasing temperature, low specific gravity (about 3.5 g/cm³) and the possibility of improving their technological properties by alloying, makes them suitable for the development of heat resistant alloys. There are 5 figures, 6 tables and 4 references, 3 of which are Soviet and 1 English.

Card 3/3

83280

18,6200 also 2108, 2308

S/136/60/000/009/002/004
E193/E483

AUTHORS: Borok, E.A., Gavrilova, V.K., Karpman, G.M.
Trifonov, Ye.A. and Zavod, Ye.B.

TITLE: Manufacture of Titanium Tubes from Sintered Material
by Extrusion and Rolling

PERIODICAL: Tsytnyye metally, 1960, No.9, pp.66-68

TEXT: Shells (85 and 100 mm in diameter, 150 to 200 mm high), prepared by powder metallurgy technique from technical grade titanium IMPl, were extruded on a 600 t vertical extrusion press, equipped with die and mandrel made of steel 3KhV8. The shells were pre-heated to 860 to 1050°C by induction heating (5 to 10 min), the temperature of the container being 200 to 250°C. A mixture of graphite and machine oil was used as a lubricant. The extrusion pressure did not exceed 180 atm when the extrusion temperature was 800°C and decreased to below 150 atm for shells pre-heated to 950°C. The extrusion speed of 8 m/sec was used, the tubes obtained being 32 to 50 mm in diameter with the wall thickness varying between 2.5 and 7.5 mm. Irrespective of the extrusion temperature employed, the extruded tubes had longitudinal scratches on both outside and inside surfaces.

Card 1/4

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E193/E483

Manufacture of Titanium Tubes from Sintered Material by
Extrusion and Rolling

The surface finish of tubes extruded at temperatures above 950°C was extremely bad. The condition of the container and particularly of the mandrel, after one operation only, was also very bad, owing to titanium adhering to their surfaces, which was also the cause of the longitudinal scratches on the extruded tubes. Somewhat better results were obtained when steel R18 was used as the material of the container lining and mandrel, but even then these parts had to be scrapped after each operation. Several attempts were made to improve the surface finish of the tubes by applying different lubricants; the best results were obtained with a mixture containing 4 parts of sodium chloride and 1 part of fluorspar which, however, failed to prevent the formation of the longitudinal scratches. The extruded tubes (measuring 32 x 3, 39 x 2.5, 41 x 3 and 50 x 7.5 mm) had the following properties: U.T.S. = 70 kg/mm²; elongation, δ , = 21%; reduction of area, ψ , = 29%; Rockwell hardness, R_c = 26. The material of the extruded tubes was markedly anisotropic in respect of its mechanical properties; micro-specimens, cut from the tubes and

Card 2/4

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E193/E483

Manufacture of Titanium Tubes from Sintered Material by Extrusion and Rolling

tested in the direction parallel to the tube axis, had U.T.S. = 104.6 kg/mm², δ = 26.2%, and ψ = 38.7%; the corresponding figures for specimens tested in the transverse direction were 120.8 kg/mm², 2.5% and 6.3%. Owing to the lack of suitable equipment, the surfaces of the extruded tubes were not improved before rolling. The slight curvature of the tubes was removed by hammering with wooden mallets at 800°C. Both ends of each tube with bad extrusion defects were cut off and the outside and inside surfaces were lubricated with a mixture of 60% emulsol and 40% graphite, no lubricant having been fed to the mandrel. The rolling operation was carried out on a tube rolling mill of the Rockwright type. To avoid cracking during rolling, the ends of each tube were machined to produce a taper at least 60 to 80 mm long. After the first rolling operation, during which the temperature of the tubes rose to 100°C, the tubes were annealed at 700°C by resistance heating, the heating time varying between 20 and 40 sec. The ends of the tubes were then cut off again and tapered, after which the second rolling

Card 3/4

83280

S/136/60/000/009/002/004
E193/E483

**Manufacture of Titanium Tubes from Sintered Material by
Extrusion and Rolling**

operation was carried out. The degree of deformation attained in the first rolling operation, without causing fracture of the tube, was 34.2%. After the intermediate annealing operation, 56.7% reduction per pass could be attained. The tubes of the following dimensions (mm) were produced by this method: 22 x 1.5, 22 x 1.25, 26 x 1.75, 26 x 2, 26.5 x 1.4, 29.8 x 1.6, 29.8 x 1.65, 34.5 x 2.4; the lengths of the tubes varied between 1500 and 6000 mm. While the results obtained showed that the technique studied had some possibilities, means of preventing adhesion of titanium on the extrusion tools will have to be found before it can become a manufacturing process. There is 1 table.

ASSOCIATIONS: TsNIIchermet

Kol'chuginskiy zavod im. Ordzhonikidze
(Kol'chygin Works im. Ordzhonikidze)

Card 4/4

84676

186200 only 2308, 2808, 1417

S/136/60/000/011/010/013
E021/E406

AUTHORS: Borok, E.A., Candidate of Technical Sciences,
Gavrilova, V.K., Karpman, G.M. and Khromov, V.G.

TITLE: Production of Titanium Strip by Rolling Powders 18

PERIODICAL: Tsvetnyye metally, 1960, No.11, pp.69-76

TEXT: The present paper gives results of a systematic study of the process of titanium strip production, carried out in 1957 to 1959. The powder used had a specific weight of 0.65 - 0.80 g/cm³ and not less than 90% of the particles were 10 μ. Impurities did not exceed: 0.25% O₂, 0.01% H₂, 0.08% N₂, 0.50% Fe + Ni, 0.08% Si, 0.05% C. A diagram of the method of production is shown in Fig.1. The thickness of the strip produced was found to be directly proportional to the specific weight of the powder and did not depend on the particle size. The maximum thickness produced was 1.20 mm on rolls of 120 mm diameter. With increase in roll diameter, the thickness of the strip could be increased. Fig.3 shows the effect of the speed of rolling on the thickness of the strip (Curve 1), the power per width of the strip in kW/cm (Curve 2), the energy consumption (Curve 3) and the productivity (Curve 4). For a rolling speed of about 3 m/min with rolls 120 mm

Card 1/3

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E021/E406

Production of Titanium Strip by Rolling Powders

in diameter and strip 120 mm wide, the production is 44 kg/hour or approximately 250 tons/year. With 500 mm wide strip it is approximately 1000 tons/year. The porosity can be varied from 23 to 57% by varying the distance between the rollers. The strip produced has sufficient strength for transferring to the sintering furnace. With increase in sintering temperature from 850 to 1150°C, the strength and plasticity of the strip increase (Table 2). After 30 minutes at 1400°C, grain growth was noted. At 950°C, increasing the time of sintering causes the number of pores to decrease and the grain boundaries to become more distinct. After two hours, grain growth occurs. Cold rolling the strip produced with 20 to 80% degree of reduction presents no difficulty. With increase in reduction, the mechanical properties increase. The properties of strip sintered at 850 to 1150°C, cold rolled and heat treated for 30 minutes at 700°C, are low. By repeating the cycle of the low temperature sinter and cold rolling, better properties similar to those of the control strip could be obtained (Table 4). Some trouble was encountered with the brittleness of the strip. This was associated with hydrogen impurity and could be removed

Card 2/3

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S/136/60/000/011/010/013
EO21/E406

Production of Titanium Strip by Rolling Powders

by degassing at 1000°C (Fig.4). The tensile strength of specimens after two cycles of the above treatment using an argon atmosphere for sintering and one vacuum degassing treatment was 67 to 69 kg/mm². The elongation was 22 to 23%. There are 6 figures and 4 tables.

ASSOCIATIONS: TsNIChERMET Borok, B.A., Gavrilova, V.K. and
Karpman, G.M.;
Gor'kovskiy politekhnicheskii institut (Gorkiy
Polytechnical Institute) Khromov, V.G. X

Card 3/3

FEDORCHENKO, Ivan Mikhaylovich; ANDRIYEVSKIY, Rostislav Aleksandrovich;
BAL'SHIN, M.Yu., kand. tekhn.nauk, retsenzent; BOROK, B.A., kand.
tekhn.nauk, retsenzent; GEGUZIN, Ya.Ye., prof., doktor fiz.-mat.nauk,
retsenzent; SAMSONOV, G.V., prof., doktor tekhn.nauk, retsenzent;
POKROVSKAYA, Z.S., red.; KADASHEVICH, O.A., tekhn. red.

[Principles of powder metallurgy] Osnovy poroshkovoi metallurgii.
Kiev, Izd-vo Akad.nauk USSR, 1961. 420 p. (MIRA 14:12)
(Powder metallurgy)

S/137/62/000/006/027/163
A006/A101

AUTHORS: Timoshenko, N. N., Borok, B. A., Teplenko, V. G., Solov'yeva, Z. V.

TITLE: Metallurgical processing of ilmenite concentrate and titanium-magnetites for the purpose of obtaining iron powder and a product with high titanium content

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 6, 1962, 13, abstract 6G93
(In collection "Titan i yego splavy", no. 5, Moscow, AN SSSR, 1961, 69 - 74)

TEXT: The technical scheme of processing ilmenite concentrate consists of the following operations: 1) crushing and mixing the charge, composed of ilmenite concentrate with 10% admixture of a solid reducing agent (carbon, carbon black, thermotails) and NaCl, added in a 20% amount of the ilmenite concentrate; 2) reduction in a furnace with any type of heating at 1,150°C; 3) discharge and grinding of the cake until -170+200 mesh particle size; 4) wet magnetic separation with repeated demagnetization of the Fe powder (weak magnetic field: 900 oersted); 5) washing from salt and drying a) of the magnetic fraction at 40 - 60°C; b) of

Card 1/2

Metallurgical processing of...

S/137/62/C00/006/027/163
A006/A101

the titanous product at 150 - 200°C; 6) if needed, additional reduction of Fe-powder in H flow at 650 - 700°C. The system was tested with titanium-magnetite ore and Fe-powder was obtained containing 96% Fe; TiO_2 extraction into the non-magnetic portion was 80%, and V_2O_5 extraction attained up to 83%.

L. Vorob'yeva

[Abstracter's note: Complete translation]

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Card 2/2

18.3100

21036
S/598/61/000/006/024/034
D245/D303

AUTHORS: Suchkov, A.B., Borok, B.A., and Yermakova, T.N.

TITLE: Electro-refining of titanium-based alloys

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Titan i yego splavy. no. 6, 1961. Metallotermiya i elektro-khimiya titana, 180 - 184

TEXT: Electrolytic refining of Ti alloys to yield pure Ti was studied in experiments carried out by the authors in a steel reactor at 800 - 950°C, the alloy filings being pulverized to a size of 10 - 20 mm and refined in batches of 1 1/2 - 2 kg. A direct relation between the purity of refined Ti and anode current density was observed. Using a Ti - 5 % Al alloy, the Al content in the cathode deposit was less than 0.05 % for a current density of 0.1 amp/cm² as compared with 1.50 % for 0.4 amp/cm² and 2.80 % for 1.2 amp/cm². Separation of Ti from V proved more difficult and could not be accomplished in a single electrolysis. In all alloy types studied the O, N and C contents were reduced to 0.06, 0.015 and 0.015 % respectively. There are 1 figure and 2 tables.
Card 1/1

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38697
S/598/62/000/007/018/040
D290/D307

18. 12. 85
AUTHORS: Kornilov, I. I., Mikheyev, V. S., Pylayeva, Ye. N., Volkova, M. A., Borok, B. A., Shchegoleva, R. P. and Golubeva, L. S.

TITLE: The effect of aluminum on the structure and properties of a Ti-Al-Cr-Fe-Si-B alloy prepared by powder metallurgy

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Titan i yego splavy. no. 7, Moscow, 1962. Metallokhimiya i novyye splavy, 130-134

TEXT: The authors studied the effect of varying amounts of Al in Ti-Al alloys (1 - 7% by weight Al) and in alloys of the Ti-Al-Cr-Fe-Si-B system (1.5 - 12% by weight Al) on the structure and properties of the alloys. Strength of the Ti-Al alloys increased from 77.2 to 107-3 kg/mm² as the Al content rose from 0 to 7%; the strength of alloy AT4 (AT4) increased from 104 to 142 kg/mm² as the Al content rose from 1.5 to 10%. Plasticities of the alloys decreased and the heat resistance of AT4 increased as the aluminum

Card 1/2

The effect of aluminum ...

S/598/62/000/007/018/040
D290/D307

contents became higher. The rate of oxidation of AT4 in air at 700°C decreases by about 60% as the Al content rose from 5 to 12% by weight. There are 4 figures and 4 tables.

Card 2/2

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S/598/62/000/007/019/040
D290/D307

18, 12 25

AUTHORS: Kornilov, I. I., Pylayeva, Ye. N., Volkova, M. A.,
Borok, B. A., Shchegoleva, R. P. and Golubeva, L. S.

TITLE: The effect of silicon on the properties of a 6-component
alloy of the system Ti-Al-Cr-Fe-Si-B prepared by powder
metallurgy

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Titan i yego
splavy. no. 7, Moscow, 1962. Metallokhimiya i novyye
splavy, 136-139

TEXT: The authors studied the effect of varying amounts of silicon
in Ti-Si alloys and in alloys of the system Ti-Al-Cr-Fe-Si-B on
the properties of the alloys, in order to find the optimum Si con-
centration in alloy AT4 (AT4). The mechanical properties were mea-
sured in both the forged and hot worked conditions. The strength
of the Ti-Si alloy increased from 77.2 to 100.8 kg/mm² as the Si
content increased from 0 - 2% while the strength of the alloy AT4
increased from 110 to 138 kg/mm² with the addition of 1.5% Si. Pla-

Card 1/2

The effect of silicon ...

S/598/62/000/007/019/040
D290/D307

sticities of the alloys decreased with rising Si content. AT4 containing 0.5% Si withstands a continuous stress of 30 kg/mm² at 500°C for about 100 hours. The corrosion resistance of AT4 at 700°C is approximately doubled by the addition of 0.5% Si. There are 4 figures and 4 tables.

X

Card 2/2

S/129/63/000/002/006/014
E193/E383

AUTHORS: Borok, B.A., Novikova, Ye.K., Golubeva, L.S.,
Shchegoleva, R.P. and Ruch'yeva, N.A.

TITLE: Dilatometric studies of binary titanium-base alloys

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov,
no. 2, 1963, 32 - 36

TEXT: Dilatometric curves were constructed in the 20 - 900 °C range for the binary Ti-Fe, Ti-Cr, Ti-Co, Ti-Mo, Ti-V, Ti-Nb and Ti-Ta alloys containing 2-10% of the alloying elements, the constitution of these alloys was determined by metallographic and X-ray diffraction analysis, and the hardness of the alloys after various heat-treatments was measured. Experimental test pieces were prepared by powder metallurgy. No deflection points were observed on the dilatometric curves in the case of specimens annealed by heating to 800 or 900 °C with slow cooling; the slope of the curves was constant, indicating that the coefficients of thermal expansion of the alloys studied in the annealed condition were constant. The hardness of the annealed alloys was either equal to or higher than that of the specimens quenched from the β -range.
Card 1/4

Dilatometric studies

S/129/63/000/002/006/014
E193/E383

the effect of the alloying-elements content (%) on the hardness (HRC) of the quenched alloys being shown in Fig. 1. The dilatometric curves of alloys with a sufficiently high content of elements stabilizing the β -phase (Fe, Cr, Co) had deflection points in the temperature range of the ω -transformation. The alloy with the critical (4%) concentration of Fe had in the quenched condition a two-phase ($\beta + \omega$) structure and high (RC 51.5) hardness. The dilatometric curve of this alloy showed no contraction associated with the formation of the ω -phase and the expansion due to a reversible ($\beta + \omega$) \rightleftharpoons ($\beta + \alpha$) transformation started at 420 and ceased at 490 °C. In the case of the quenched alloy with 6% Fe, consisting of the β - and partially precipitated ω -phases (hardness 44.5), the ω -phase was precipitated completely on heating, as a result of which the hardness of the alloy increased to RC 53; the dilatometric curve showed a contraction associated with the $\beta \rightleftharpoons \omega$ transformation in the 170 - 400 °C range and an expansion in the 475 - 500 °C interval, where the ($\beta + \omega$) \rightleftharpoons ($\beta + \alpha$) transformation took place. The hardness of quenched alloys with 8% Fe, consisting of the stabilized β -phase, increased on heating from 41.5 - 53. The small contraction and expansion on the dilatometric curve of

Card 2/4

Dilatometric studies

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E193/E583

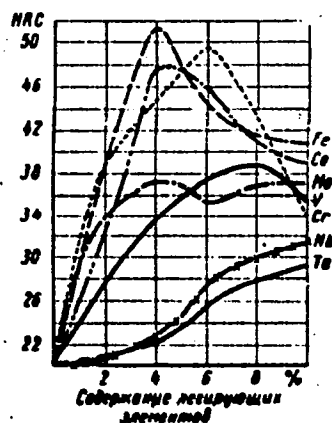
this alloy indicated only a partial precipitation of the ω -phase. Similar effects were observed in the Ti-Cr alloys in which, however, the volumetric changes were less pronounced; the critical Co content was about 3.5% in the case of the Ti-Co alloys. X-ray diffraction analysis showed that quenched specimens of the 4% Co-Ti alloy had a two-phase structure (β - and partially precipitated ω -phase); the precipitation of the ω -phase in this alloy on heating (indicated by an increase in hardness from 48 - 50 RC) was, for some unknown reason, not reflected by deflection points on the dilatometric curve. In the case of the Ti-Mo alloys the volumetric effect was observed in the 10% Mo alloy only, indicating that the ω -transformation did not take place in alloys containing 2 - 8% Mo. No deflection points were observed on dilatometric curves for the Ti-V, Ti-Nb and Ti-Ta alloys. This was attributed to the fact that the ω -phase in these alloys could be formed only at a high concentration of the alloying elements (12 - 13% V, 23 - 30% Nb and 26 - 40% Ta). There are 3 figures and 1 table.

Card 3/4

Dilatometric studies

S/129/63/000/002/006/014
E193/E383

Fig. 1:



Card 4/4

11288-63

ACCESSION NR: AP3001956

BWP(q)/EWT(m)/BDS--AFPTC/ASD--JD

S/0226/63/000/003/0088/0098

AUTHOR: Borok, B. A.; Golubeva, L. S.; Shchegoleva, R. P.; Ruch'yeva, N. A.

TITLE: Mechanical properties and microstructure of sintered titanium alloys

SOURCE: Poroshkovaya metallurgiya, no. 3, 1963, 88-98

TOPIC TAGS: sintered titanium alloys, mechanical properties, microstructure, grain size, alloying element effect, Fe, Mn, Cr, Mo, Al, V, W, Ta, Nb, Cu, Zr, Co, Ti-Al-V alloy, Ti-Al-V-Mo alloy, coreduction, oxide

ABSTRACT: Several series of binary and ternary alloys of Ti with Al, Fe, Mn, Cr, Mo, W, V, Ta, Nb, Cu, Zr, and Co were sintered from commercial-grade (99.17% pure) Ti powder and powders of 99.6% pure Fe, 99.5% pure Mn, 99.69% pure Cr, 99.54% pure Ni, 99.2% pure Co, electrolytic Cu, 99.8% pure W, 99.65% pure Mo, 99.62% pure V, 98.6% pure Nb, and 98.6% pure Ta. The Ti-Al alloys and the second series of Ti-V alloys were prepared by coreduction of oxide powders with calcium hydride. Sintered specimens had a coarse, acicular microstructure, macrograins about 1 mm in diameter, and a density of 97-99% of the theoretical. The results of mechanical tests (see Figs. 1 and 2 of Enclosure) show that all the alloying elements investigated increase the tensile strength

Card 1/3

- 7. (2/55) -

L 11288-63

ACCESSION NR: AP3001956

and decrease the ductility of sintered Ti alloys. Only in Ti-V alloys produced by coreduction of oxides does ductility increase with increasing V content. These alloys generally are more ductile than commercial titanium. The strong β -phase stabilizers, Fe, Mn, and Cr, which promote eutectoid transformation with the formation of intermetallic compounds, produce the highest increase in tensile strength and decrease in ductility of sintered Ti alloys. The Ti-Fe, Ti-Mn, Ti-Cr, and Ti-W alloys containing 2-10% of the following element have a metastable $\alpha + \beta$ structure with the amount of the β -phase increasing with higher alloying; the α -phase has an acicular Widmanstätten structure. Aluminum, an α -phase stabilizer, appreciably increases the strength of sintered Ti-Al alloys without an extensive decrease in ductility. The Ti-V and Ti-Mo alloys have comparatively high tensile strength and ductility. In general, V, Al, and Mo were found to be the best alloying elements for sintered binary Ti alloys. Additional investigation of sintered Ti-Al-V alloys (produced by coreduction of the oxides) showed the Ti + 3% Al + 3% V alloy to have the best combination of mechanical properties: tensile strength of 774.2 Mn/m² [meganewton per square meter, 1 Mn/m² = 0.1 kg/mm²], elongation 15%, reduction of area 26%, and notch toughness 25.4 joule per cm² [1 joule/cm² = ~ 0.1 m-kg/cm²]. An addition of 2% Mo to this alloy increases its tensile strength to 857.5 Mn/m² without lowering ductility. These two alloys are recommended for manufacturing parts by

Card 2/52

AKSENOV, G.I.; BOROK, B.A.; MALIN, A.P.; KHROMOV, V.G.

Experience in the industrial rolling of metal powders. Trudy LPI
no.222:40-44 '63. (MIRA 16:7)
(Rolling (Metalwork)) (Powder metallurgy)

AL'TMAN, M.B.; BOROK, B.A.; MERKULOV, V.V.; MALIN, A.P.; SPEKTOR, Yu.V.;
NIKITSKIY, S.V.; TROFIMOV, N.I.; LAMBINA, V.I.

Foamed aluminum castings. Alum. splavy no.1:41-49 '63.
(MIRA 16:11)

BOROK, B.A.; GOLUBEVA, L.S.; SHCHEGOLEVA, R.P.; RUCH'YEVA, N.A.

Mechanical properties and microstructure of sintered titanium alloys. Porosh.met. 3 no.3:88-98 My-Je '63. (MIRA 17:3)

1. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metal-lurgii.

ACCESSION NR: AP4040471

S/0226/64/000/003/0050/0061

AUTHOR: Borok, B. A.; Shchegoleva, R. P.; Golubeva, L. S.;
Teplenko, V. G.; Reutova, N. P.; Ruch'yeva, N. A.

TITLE: Properties and microstructure of sintered Kh18N15 stainless
steel made by joint reduction method

SOURCE: Poroshkovaya metallurgiya, no. 3 (21), 1964, 50-63

TOPIC TAGS: stainless steel, sintered stainless steel, carbonyl
iron, sintered steel property, steel corrosion resistance, sintered
steel structure

ABSTRACT: Investigations have been made of the properties of
sintered Kh18N15 chromium-nickel stainless steel made from powder
produced by the joint reduction of chromium and nickel oxides
mixed with iron powders (Process A) and of steel made from mechan-
ically mixed powders of carbonyl iron, reduced chromium, and electro-
lytic nickel (Process B). It was found that the density of compacts
A was lower than that of B, but the latter had a very low compression
strength. Adequate fluidity of powders and strength of compacts

Card 1/3

ACCESSION NR: AP4040471

make powder A a very suitable material for rolling porous strips and sheets in continuous rolling mills. Compacts B sinter more easily than compacts A, but they are much more susceptible to oxidation during the sintering. Compacts A, sintered at 1350C for 10 hr; had a density of 96—97% (compared to 71—85% for compacts B), tensile strength 47.8—53.5 dan/mm², elongation 29.2—43.4% and impact toughness (unnotched specimens) 19.8—29 kgm/cm². Sintered Kh18N15 steel has an austenitic structure with a low content of finely dispersed carbides. In the annealed state the steel has a high corrosion resistance; its corrosion rate in boiling 65% nitric acid is 0.1 g/m² · hr compared to 0.2 g/m² · hr for conventionally made X18H15. This is explained by a low content of impurities in powder A. Orig. art. has: 8 tables and 9 figures.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (Central Scientific Research Institute of Ferrous Metallurgy)

Cord 2/3

ACCESSION NR: AP4040471

SUBMITTED: 16Feb63

DATE ACQ: 06Ju164

ENCL: 00

SUB CODE: MM

NO REF SOV: 011

OTHER: 005

Cord 3/3

ACCESSION NR: AR4018321

S/0137/64/000/001/0039/0040

SOURCE: RZh. Metallurgiya, Abs. 1G273

AUTHOR: Borok, B. A.; Tepenko, V. G.; Solov'yeva, Z. V.; Reutova, N. P.

TITLE: Basic principles and technology of production of powder alloys

CITED SOURCE: Tr. Kuybyshchensk. aviats. in-t, vy*p. 16, 1983, 23-30

TOPIC TAGS: powder alloy production, oxide powder production, steel powder production

TRANSLATION: A description is given of a method for the preparation of multicomponent alloys via joint reduction of a mixture of component oxides by Ca hydride, e.g., $n\text{Cr}_2\text{O}_3 + m\text{NiO} + p\text{Fe}_2\text{O}_3 + s\text{TiO}_2 + k\text{CaH} \rightarrow 2n\text{Cr} \cdot m\text{Ni} \cdot 2p\text{Fe} \cdot s\text{Ti} + k\text{CaO} + \text{H}_2$, where $k = 3n + 3m + 3p + 2s$. The alloys obtained are homogeneous in composition and crystal structure and are in exact agreement with the corresponding phase diagrams. Metal powders can be added to the charge along with the oxides in order to decrease the exothermic effect. A selective reduction of the oxide mixtures takes place in conformity with their free energies of formation at comparatively low temperatures (600-800°). At higher temperatures, the oxides react with one another to form complex oxides and

Card 1/2

ACCESSION NR: AR4018321

their reduction by CaH_2 follows a complex course. CaO formed during reduction acts as a separator which prevents the particles from sintering. When the CaO content of the reaction products is insufficient to eliminate sintering, an additional amount of CaO is added to the charge. NaCl can also be used as the separator. CaO is removed from the final product by quenching with water and subsequent treatment with a dilute HCl solution, washing the CaCl_2 off with water, and drying the powder in vacuum desiccators. The method described is used in the production of powders of stainless steels $1\text{Kh}18\text{N}9\text{T}$, $1\text{Kh}17\text{N}2$, $0\text{Kh}18\text{N}9$, nichromes $\text{Kh}20\text{N}80$ and $\text{Kh}25\text{N}75$, and other alloys. V. Neshpor

SUB CODE: MM

ENCL: 00

Card 2/2

I 61032-65 EMP(e)/ENT(m)/EPF(n)-2/EMP(t)/EMP(k)/EMP(z)/EMP(b) Pf-4/Pu-4

ACCESSION NR: AR5017420 IJP(c) M/36 UR/0137/65/000/006/G029/G029

SOURCE: Ref. zh. Metallurgiya, Abs. 6G198

53
B

AUTHOR: Meyerson, G. A.; Borok, B. A.; Lobashev, B. P.

TITLE: Investigation of a process for the hydrostatic pressing of metallic powders

CITED SOURCE: Tr. 7 Vses. nauchno-tekhn. konferentsii po poroshk. metallurgii. Yerevan, 1964, 106-121

TOPIC TAGS: powder metal compaction, titanium, copper, molybdenum, hydrostatic pressure, specific density, cold hardening, hardness

TRANSLATION: Hydrostatic pressing of titanium, copper, and molybdenum powders over a range of pressures from 3 to 68 kg/mm² was investigated. To describe the dependence of the relative density of the briquets, v , on the pressing pressure, p , the equation $p/p_{max} = v^m$ was used, where p_{max} is the pressure necessary to ensure production of a briquet with a density of 100%, and m is a constant. This equation describes hydrostatic pressing more accurately than the

Card 1/2

L 61032-65

ACCESSION NR: AR5017420

conventional pressing process. In hydrostatic pressing of copper powder, $P_{max} = 66.22 \text{ kg/mm}^2$; $1/m = 0.21$; the respective values for titanium powder are 97.95 and 0.266; for standard molybdenum powder 169.00 and 0.202; for refined molybdenum powder 170.20 and 0.208. Analysis of the curve $\log p - \log v$ showed that, in contrast to conventional pressing, in the hydrostatic pressing of briquets up to $v = 83-85\%$, no appreciable cold hardening of the particles occurs. The microhardness of copper particles does not change after hydrostatic pressing under a pressure up to 20 kg/mm^2 , while after conventional pressing the microhardness of the particles increases. The absence of cold hardening after hydrostatic pressing is explained by the impossibility of directed plastic deformation. The efficiency of hydrostatic pressing is explained not only by the absence of losses due to external friction, but also by the 3-dimensional displacement of the particles. The scattering of the density of large briquets (diameter 140-180 mm) produced by hydrostatic pressing is within the limits of the accuracy of the measurements. With hydrostatic pressing the air pressure in the pores is insignificant.

M. Bal'shin

SUB CODE: MM

ENCL: 00

Cord 2/2 *ddr*

L-57723-65 EPF(c)/EFR/ENG(j)/EWP(z)/ENA(c)/EWT(m)/EWP(f)/T/EWA(d)/EWP(w)/
EWP(t) Pr.h/Ps-/Pad IJP(c) JD/HW

ACCESSION NR: AR5015163

UR/0137/65/000/005/G034/G034

SOURCE: Ref. zh. Metallurgiya, Abs. 50202

44

AUTHOR: Borok, B. A.; Karpman, G. M.

43

TITLE: Investigation of the effect of dispersed inclusions of aluminum oxide on the properties of nickel.

CITED SOURCE: Tr. 7 Vses. nauchno-tekhn. konferentsii po poroshk. metallurgii. Yerevan, 1961, 190-194

TOPIC TAGS: nickel, aluminum oxide, inclusion, particle size, metal mechanical property, metal hardness

TRANSLATION: The article presents the results of an investigation of the effect of dispersed inclusions of Al_2O_3 (beta and gamma modifications) with a particle size, respectively, of 0.1 and 0.014 microns on the properties of nickel. The materials were mixed in a ball mill for 24 hrs, pressed hydrostatically, sintered at 1050° , and worked by extrusion (degree of reduction 90%, extrusion speed 30-35 mm/sec). The worked samples were annealed at $100-1200^\circ$ for 1 hr. The hardness of samples with nickel / 3% beta- Al_2O_3 decreased after annealing at $500-600^\circ$; while for samples with nickel / gamma- Al_2O_3 it decreased after annealing at 1000° .

1-57723-65

ACCESSION NR: AR5015163

at 1000-1200°. The temperature of the start of recrystallization, determined by an X-ray method based on the appearance of point reflections on the intensified lines, was identical (400°) for both pure nickel and for samples of nickel / 3% (beta or gamma Al_2O_3). However, the hardness of nickel / Al_2O_3 compositions does not decrease even after recovery at very high temperatures. Inclusions of gamma- Al_2O_3 increase $\sigma_{0.2}$. V. Shelamov.

SUB CODE: MM

ENCL: 00

Card 2/2

L 1661-66 EWP(e)/EWT(m)/EWP(t)/EWP(k)/EWP(z)/EWP(b) JD

ACCESSION NR: AT5022887

UR/2776/65/000/043/0005/0020

AUTHOR: Borok, B. A. 44,55

TITLE: New directions in the development of powder metallurgy 35 B+1

SOURCE: Moscow. 44,55 Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Sbornik trudov, no. 43, 1965. Poroshkovaya metallurgiya (Powder metallurgy), 5-20

TOPIC TAGS: powder metallurgy, grain structure, rolling mill, titanium, stainless steel, metal powder, sintering

ABSTRACT: This survey shows how the employment of the powder-metallurgical method in the production of metallurgical semifinished products is now becoming feasible as the difficulties involved are being surmounted. By means of such techniques as hydrostatic pressing and induction sintering, large sintered billets can be produced from the powders of pure metals and alloys; they have the advantage of a homogeneous chemical composition and structure. The possibility of hardening metals by means of dispersed inclusions of oxides, nitrides, etc., makes it possible to develop new materials for work at high temperatures and loads. Thus, the

Card 1/3

L 1661-66

ACCESSION NR: AT5022887

Central Institute of Scientific Research in Ferrous Metallurgy has been developing the first industrial-scale mill for the rolling of metal powders and has already used it to roll sheets 5-7 mm thick and as much as 630 mm wide from powders of iron, electrolytic titanium, aluminum and certain alloys obtained by combined reduction (nichrome, stainless steel). The powder-metallurgical method of the production of semifinished products is economically worthwhile, since the sintered billets do not require cold working. True, in some cases the production cost is higher, owing to the high cost of the metal powders, but once the scale of production is sufficiently large this factor can be considerably reduced. The methods developed for producing strip and sheet metal by the direct rolling of powders assure a high percentage of acceptable output and makes possible the complete mechanization and automation of the production process. For example, the wastes in the production of titanium pipe by extrusion reach 50% of the weight of metal, whereas when this pipe is produced by the powder-metallurgical pressing and sintering method the wastes are only 5%. The homogeneity of composition and fine-grained uniform structure of the sintered billets of multicomponent alloys assure their deformability. Orig. art. has: 7 figures, 3 tables.

ASSOCIATION: none

Card 2/3

L 1661-66

ACCESSION NR: AT5022887

SUBMITTED: 00

ENCL: 00

SUB CODE: MM HT

NO REF SOV: 013

OTHER: 003

Card

3/3

DP

L 1662-66 EWT(d)/EWP(e)/EWT(m)/EWP(v)/EWP(t)/EWP(k)/EWP(h)/EWP(z)/EWP(b)/
EWP(l)/EWA(c) JD/HW

ACCESSION NR: AT5022888

UR/2776/65/000/043/0053/0059

AUTHOR: ^{44,55}Borok, B. A.; ^{44,55}Malin, A. F.; ^{44,55}Markelov, V. V.; ^{44,55}Andreyev, P. S.; ^{44,55}Kutyryna, V. M.; ^{44,55}Loginov, A. A.; ^{44,55}Grosval'd, V. G.; ^{44,55}Aksenov, G. I. ⁵⁷
^{BT1}

TITLE: Experience in rolling powders in an industrial-type rolling mill

SOURCE: ^{44,55}Moscow, Tsentral'nyy nauchno-issledovatel'skiy inatitut chernoy metal-
lurgii. Sbornik trudov, no. 43, 1965. Poroshkovaya metallurgiya (Powder metal-
lurgy), 53-59

TOPIC TAGS: rolling mill, powder metallurgy, metal powder, powder metal rolling

ABSTRACT: The authors describe an industrial two-high powder-rolling mill with roll diameters 600 and 900 mm, based on a standard rolling mill originally built in 1940, and equipped with special powder-feeding bunkers. The mill consists of an open-top steel housing with variable positioning of rolls -- they can be aligned either horizontally or at angles of 22.5°, 45°, and 60° (Figs. 1, 2). Its main drive is powered by a DC 257.4 kw (350 HP) 40-800 RPM motor. It has been used for the experimental rolling of strips from the powders of iron, OKh18N9 stainless steel, molybdenum, and titanium. These experiments demonstrated the

Card 1/5

L 1662-66

ACCESSION NR: AT5022883

mill's suitability for organizing the industrial production of poreless strips from the powders of different metals and alloys. Such strips, 0.8-1.0 mm thick, display physical properties that are not inferior to those of strips produced by rolling ingot metal. This strip thickness is in complete agreement with the basic equation of rolling, which implies that strip thickness is a function of roll diameter:

$$\gamma_s = \frac{\gamma_p}{\tau} \left[1 + \frac{D}{\delta} + \frac{\alpha^2}{2} \right], \quad (1)$$

where γ_p and γ_s are the densities of powder (bulk weight) and strip, respectively, g/cm³; D is the roll diameter, δ is the thickness of rolled strip, mm; α is the angle of reach, deg; and τ is the coefficient of reduction of the powder during rolling. Hence this basic equation applies not only for laboratory rolling mills but also for industrial rolling mills and can be used in designing the latter. Before the rolling of metal powders can be industrially introduced, however, these three problems must be solved: lateral restriction of the zone of deformation of powder in the rolls; continuous, uniform supply of powder to the feeder; and con-

2/5

Card

L 1662-66

ACCESSION NR: AT5022888

tinuous sintering of the strip. Orig. art. has: 2 figures, 3 tables, 5 formulas.

ASSOCIATION: none

SUBMITTED: 00

ENCL: 02

SUB CODE: MM, MT

NO REF SOV: 010

OTHER: 005

Card

3/5

L 1662-66

ACCESSION NR: AP5022888

ENCLOSURE: 01

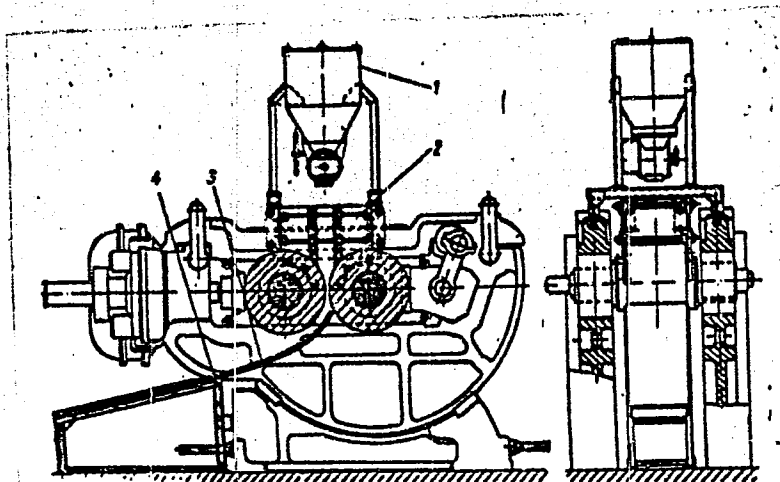


Fig. 1. Diagram of modified rolling mill (horizontal positioning of rolls):
1 - bunker; 2 - feeder; 3 - receiving chute; 4 - receiving table

Card 4/5

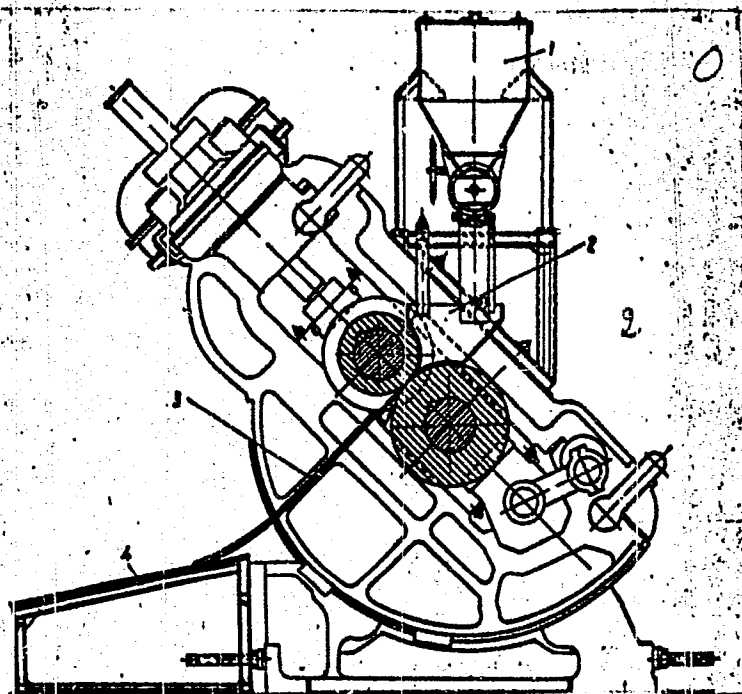
L 1662-66

ACCESSION NR: AP5022888

ENCLOSURE: 02

Fig. 2. Diagram of modified rolling mill
(tilted positioning of rolls)

1 - bunker; 2 -
feeder; 3 - recei-
ving chute; 4 -
receiving table



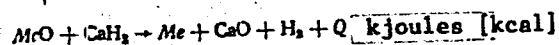
Card 5/5 *AP*

L 2924-66 EWP(e)/EWT(m)/EWP(i)/EWA(d)/EWP(t)/EWP(z)/EWP(b) IJP(c) JD/JW/JG
 ACCESSION NR: AT5022890 UR/2776/65/000/043/0069/0080 49
 AUTHOR: Borok, E. A.; Teplenko, V. G. 46
 44,55 44,55 41
 TITLE: Production of the powders of alloys and steels by means of the combined reduction of oxide mixtures by calcium hydride
 SOURCE: Moscow. Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metal-
 44,55 lurgii. Sbornik trudov, no. 43, 1965. Poroshkovaya metallurgiya (Powder metal-
lurgy), 69-80
 TOPIC TAGS: metal oxide reduction, stainless steel, powder alloy, oxide forma-
 14
 tion, calcium oxide
 ABSTRACT: The powders of Al, Ti, Fe, Nb, and other metals with a low content of
 27 27 27
 impurities can be successfully produced by reducing their oxides only if an
 active reducing agent with a high loss of the free energy of oxide formation is
 used (e.g., Ca, Mn, or Na). Such an agent should not form any alloy or chemical
 compounds with the reduced metal, and the reaction products (CaO, MgO, etc.)
 should be easily separated by some known technique of mechanical or chemical con-
 centration. These requirements are completely met by metallic calcium. The free
 Cord 1/3

L 2924-66

ACCESSION NR: AT5022890

energy of formation and heat of formation of the oxides of Ca (CaO) are higher than for the other suitable reducing agents known. Since, however, the use of metallic Ca for this purpose presents certain practical difficulties, as well as the danger of ignition and explosion, calcium hydride CaH₂ is used instead. Then the reduction of the oxides of metals follows the reaction:



As experiments have shown, it is expedient to prepare the charge partly from metal powders and partly from metal oxides. This serves to reduce the thermal effect of the reaction and the expenditure of expensive CaH₂. Thus, for example, the powder of 1Kh18N9T stainless steel (72% Fe, 18% Cr, 9% Ni, 1% Ti) is prepared by reacting with CaH₂ a mixture of Fe powder (base), ferric oxide, nickel oxide, chromium oxide, and titanium dioxide. The total amount of oxygen is 13% by weight. The amount of CaH₂ should be such as to assure complete combination with oxygen to form CaO, with an excess of 10%. Increasing the reduction temperature from 700 to 1200°C causes oxygen content of the obtained 1Kh18N9T powder to decrease to 0.09% from 4.64%. Micro- and macrostructural examination of the

Card 2/3

L 2924-66

ACCESSION NR: AT5022890

sintered billets (diameter up to 180 mm and mass (weight) up to 100 kg) obtained from the powder of different multi-component steels and alloys established that, by contrast with ingots of analogous compositions, they have a fine-grained homogeneous structure and hence are satisfactorily deformable. Thus, with the aid of CaH_2 , it is now possible to use powder-metallurgical techniques in the production of steels and alloys of a complex composition, containing alloy elements with a high thermodynamic activity (e.g. Al, Ti, Cr, Si, Nb). Orig. art. has: 3 figures, 5 tables, 3 formulas 16

ASSOCIATION: none

SUBMITTED: 00,

ENCL: 00

SUB CODE: MM

NO RKF SOV: 009

OTHER: 002

PC

Card 3/3

L 3987-66 EWP (e)/EWT(m)/EPF(c)/EPF(n)-2/I/EWP(t)/EWP(k)/EWP(z) (b)/EWA(c)

ACC NR: AT5022895 IJP(c) (MOW/CL)/JD/WW/HW/JG

UR/2776/65/000/043/0119/0130

AUTHOR: Borok, B. A.; Karpman, G. M.

TITLE: Investigation of the effect of oxide dispersion inclusions on properties of nickel

SOURCE: Moscow. Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Sbornik trudov, no. 43, 1965. Poroshkovaya metallurgiya (Powder metallurgy), 119-130

TOPIC TAGS: nickel, nickel alloy, dispersion strengthened refractory oxide, oxide containing alloy, alloy property, aluminium oxide containing alloy, titanium oxide containing alloy, chromium oxide containing alloy, zirconium oxide containing alloy

ABSTRACT: The effect of finely dispersed refractory oxides on the properties of nickel has been investigated. Nickel powder with 1-7% additions of Al_2O_3 , TiO_2 , Cr_2O_3 , or ZrO_2 oxides was cold compacted under 200-1000 Mn/m^2 pressure and then sintered at 700-1400C. The oxides, especially Cr_2O_3 , decreased the density of green compacts, but the alloy with Cr_2O_3 compacted under at least 400 Mn/m^2 pressure, attained a density after sintering at 1050C of 87%, which was much higher than that of other alloys tested. The density of alloys with Al_2O_3 , TiO_3 , and ZnO_2 sintered at 1050C largely depends upon the compacting pressure. Only with sintering at 1400C was a density of over 90% attained in all investigated alloys regardless of the compacting pressure. At this temperature, the oxide particles coagulate into large inclusions. 1100C is considered the optimum sintering temperature. With increasing oxide content, the alloy

Card 1/2

L 3987-66

ACC NR: AT5022895

hardness, yield strength, and, to some extent, the tensile strength increase, but the ductility decreases. The dispersed oxides have no effect on the nickel recrystallization temperature, but they increase the softening temperature by 500—600C. Alloying with Al_2O_3 greatly improved the heat resistance. Alloy with 5% Al_2O_3 under 29.4 Mn/m^2 pressure at 800C has a rupture life of 625 hr, compared to 9 hr for unalloyed nickel. The other oxides have no significant effect on the alloy rupture strength at high temperatures. Orig. art. has: 11 figures and 2 tables. [ND]

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii, Moscow (Central Scientific Research Institute of Ferrous Metallurgy)

SUBMITTED: 00
NO REF SOV: 001

ENCL: 00
OTHER: 011

SUB CODE: NM
ATD PRESS: 4/20

PC
Card 2/2

L 07435-67 EWP(k)/EWT(m)/EWP(e)/EWP(t)/ETI IJP(c) MJW/JD/HW/JG

ACC NR: AP6029223

SOURCE CODE: UR/0145/66/000/004/0151/0156 53

AUTHOR: Malin, A. P. (Engineer); Sukhov, A. V. (Aspirant); Gromova, S. P. (Engineer); Polyayev, V. M. (Candidate of technical sciences); Borok, B. A. (Candidate of technical sciences)

ORG: None

TITLE: Development of technology for producing porous fittings

SOURCE: IVUZ. Mashinostroyeniye, no. 4, 1966, 151-156

TOPIC TAGS: porous metal, powder metallurgy, hydrostatic pressure, nichrome alloy, stainless steel

ABSTRACT: The article is a summary of work on the production of porous pipes from nichrome, molybdenum, stainless steel and nickel by powder metallurgy methods. The best materials for this purpose are Kh80N20 nichrome powder produced by joint reduction, or a mixture of GKN5-48-NP nickel and TsNIICM TU 1-53 chromium powders. Experiments on development of technology for manufacturing porous fittings from these metal powders showed that pipe sections with a wall thickness from 15 to 0.5 mm may be produced by hydrostatic pressing and sintering in hydrogen furnaces. This method may be used for producing porous fittings with a height which is limited only by the dimensions of the hydrostatic press and the sintering furnace with theoretically unlimited possibilities

Card 1/2

UDC: 621.9-496

I. 07435-67

ACC NR: AP6029223

for increasing size. Shrinkage during pressing takes place uniformly over the entire height of the fitting. The particles of powder do not move along the rubber shell and consequently there is no friction. This gives the finished part identical density (porosity) at all points. It is shown that the porosity of the finished product is a function of the granulometric composition of the powder, the hydrostatic pressure, the quantity of binder used and sintering conditions. The article was presented for publication by Doctor of technical sciences, Professor V. G. Saksel'tsev, MVTU. Orig. art. has: 5 figures, 2 formulas.

SUB CODE: 11, 13/ SUBM DATE: 27Nov64

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Card 2/2

L 41273-66 EWP(e)/EWT(m)/EWP(t)/ETI/EWP(k) IJF(c) JI, JG

ACC NR: AP6021265

SOURCE CODE: UR/0128/66/000/003/0037/0038

AUTHOR: Voronin, Yu. V. (Engineer); Golikov, I. N. (Dr. of technical sciences); Borok, B. A. (Candidate of technical sciences); Dzneladze, Zh. I. (Candidate of technical sciences); Goryunov, I. I. (Candidate of technical sciences); Sedova, Z. I. (Engineer)

ORG: none

TITLE: Molybdenum molds for pressure die casting of steel

SOURCE: Liteynoye proizvodstvo, no. 3, 1966, 37-38

TOPIC TAGS: molybdenum, pressure casting, metal casting, hot die forging/3Kh2V8 steel, TsSDM molybdenum

ABSTRACT: 3Kh2V8 steel as well as copper alloys, which are currently used as the materials of molds for pressure die casting of steel, are of insufficient strength, and this hampers the widespread introduction of pressure die casting. In this connection, the authors experimented with the use of TsSDM molybdenum, obtained by powder-metallurgical methods. Sintered blanks weighing up to 16 kg, measuring 90 mm in diameter and 180 in height, were drop-forged into 40x115x160 mm sheet bars (at temperatures beginning with 1600-1650°C and ending with 1100-1200°C). Molds made of sintered and deformed Mo were heated at various temperatures,

Card 1/2

UDC: 621.744.3.004.6:621.74.043.2:669.14

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thus establishing that the danger of the breakage or hot cracking of the molds can be eliminated if they are heated to 300°C when used in the pressure die casting of 20 and 1Kh18N9T¹ steels. Their service life is longer than that of 3Kh2V8 steel: they retain a satisfactory shape after being re-used 540 times, whereas molds made of 3Kh2V8 steel can be satisfactorily re-used only 240 times. Thus, the use of molybdenum molds may markedly reduce casting cost. Orig. art. has: 3 figures and 3 tables.

SUB CODE: 13,11/ SUBM DATE: none/ ORIG REF: 003/ OTH REF: 004

Card

2/2 *LC*

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pseudoarthrosis, supracondylar of femur-tibia, surg., intramedullary nailing using compression (Hun))

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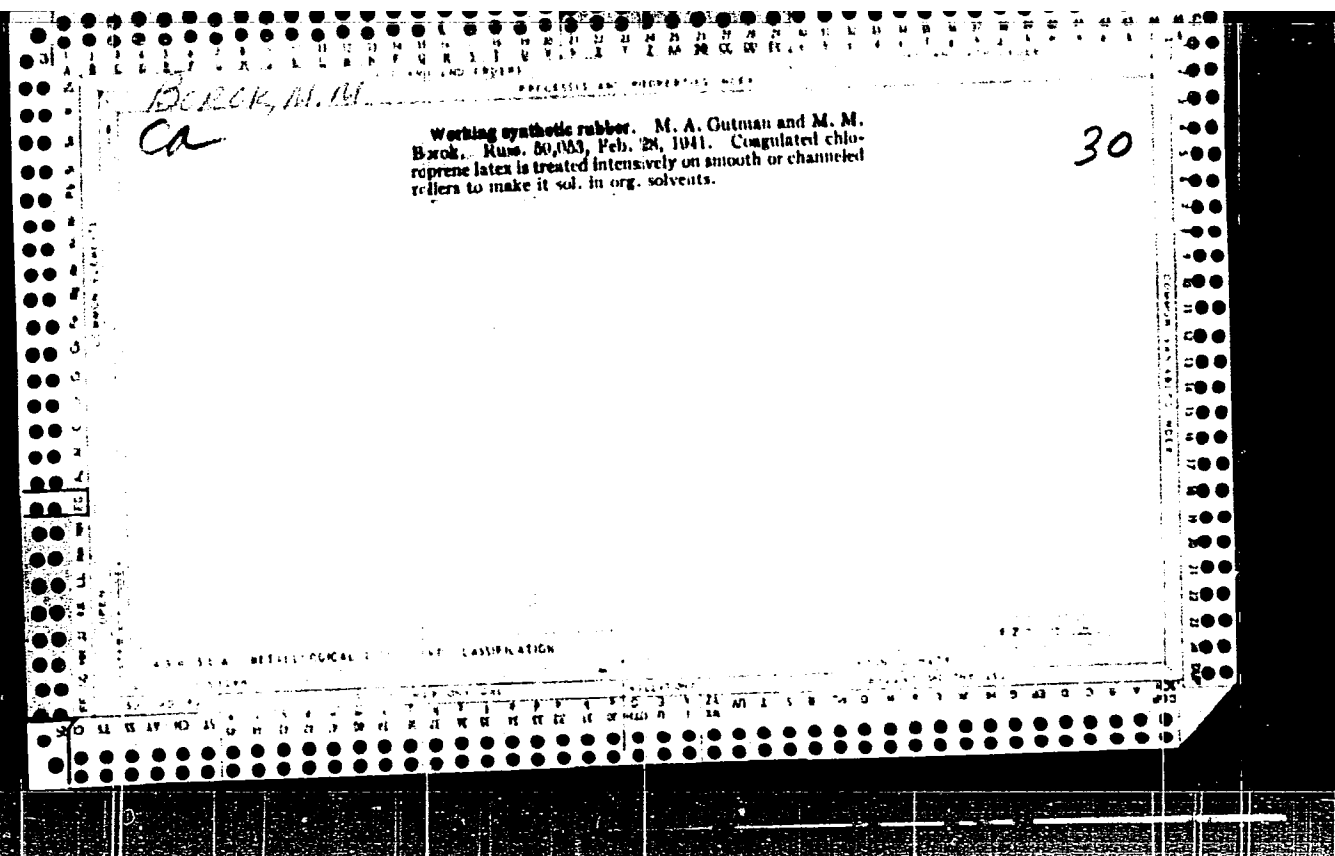
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